Out of the gates a-drip, as it had dashed Through sudden showers of old Falernian juice, Rings the red car; the mellow air is flashed With music; song and merriment let loose Their fluttering reins, and follow round the hill With flying hair like ancient charioteers When Nero led the circuit! Hark! be still! Just at the turn where Caius Cestius rears His marble peak, they halt their furious race, And pass demurely, voiceless, with bent heads. Sighing, they pass with melancholy pace Where Keats and Shelley lie in flowery beds. The lowest deity of classic Greece Here, like the highest, bows the willing knee: The last of her anointed bards were these, Though born in exile, where the northern sea Climbs the white cliffs, and, blind with his own locks, Chants to the land Homeric tales of war; Or, like pale Sapplio, on the summer rocks Breathes of Ionian isles that woo from far.

Under cathedral branches, tall and dark,
O'er flowery choirs and ivy-clad retreats,
Here swells the requiem of Shelley's lark,
Here, nun-like, chants the nightingale of Keats.
Though far from England's shrine, they sleep apart,
Their "Minster Abbey" is the world's great dome—
Their "Poets' Corner" is its mighty heart,
While tear-fed blossoms write their epitaphs in Rome!
T. Buchanan Read.

PHANTOM LIMBS.

S. weir Mitchell.

TOWARD the end of the great rebellion there existed in South street, Philadelphia, a hospital of several hundred beds, which was devoted altogether to the lodging and care of men in need of artificial limbs. It was known as the "Stump Hospital," and was certainly full of the strangest interest for even the least thoughtful observer. In almost every other hospital a large share of the damage done by bullet or bayonet was hidden by dress or bandage; but in this every man's loss was visible, and the hundreds of men, less by a leg or an arm, who filled its courts and lounged in the neighbor-

hood, presented sights at once pitiable and singular.

Only a few of the poor fellows thus mutilated reached this house of repair, nor is it easy at present to learn what number of our wounded survived amputations, since the documentary evidence is either incomplete or inaccessible. "Executive Document 108, H. R., 1st session 39th Congress," furnishes a list of 6075 men to whom artificial limbs had been supplied; but the return of those furnished under the act of 1870 is not as yet made up. The medical history of the war, when published, will probably afford a comparatively com-

plete estimate, including a statement of the limbs given to Confederate soldiers by the Southern Aid Society. It is unlikely, however, that we shall ever possess a full record of these mutilations, because there are numerous persons of the rank of officers and others whose means keep them out of the pension tables, which must, of course, be our best sources of information. Moreover, for obvious reasons, the Southern lists cannot be even approximately full. In all probability, however, there are in this country at least fifteen thousand men who lost an arm or a leg in the war. How many have endured the removal of more than one limb we do not know; but instances of recovery from double or treble amputations must, of course, be rare, nor is there any record of these losses, which, for many reasons, are interesting alike to the surgeon and to the physiologist. There survive, however, a considerable number of men who have lost both arms and one leg; one, at least, who lost both legs and an arm, and several who have parted with the two upper extremities or the two lower. One instance is known-and perhaps there are others-of the loss of all four limbs: that is to say, of both feet and both hands; but, so far as we are aware, no one survived the removal of all four limbs above the elbows and knees, although such a case is said to have occurred in the Napoleonic wars-that of a soldier who was long a pensioner at the Hôtel des Invalides.

Until very lately no careful scientific study has been made of the physiological conditions which arise in persons who have been so unhappy as to lose limbs, and perhaps therefore a clear and brief statement of these peculiarities may not be wanting in interest. The opportunity for such study is now to be sought in civil life and in the existing asylums for soldiers; and since the phenomena observed are often strange and even startling, it is necessary to choose the cases for observation with great care, because the natural tendency of many witnesses, especially

among the uneducated, is to color too strongly their answers in regard to points which excite wonder or sympathy. Unhappily, the ample chances for study which the Stump Hospital offered were never made use of, and, let us hope, may not offer again in our time.

The feelings and delusions entertained by men who have lost members have often been the subjects of casual notice in surgical treatises, from Ambroise Paré's time to our own, but even in the best books there is as yet no clear and detailed statement as to this subject, which for interest alike popular and scientific is hardly to be surpassed, even in this time of scientific sensationalism.

Some years ago an article was published in the Atlantic Monthly which purported to be the autobiography of an officer who had survived the loss of all of his limbs. This sketch gave an account of the sensations of men who have lost a limb or limbs, but the author, taking advantage of the freedom accorded to a writer of fiction, described as belonging to this class of sufferers certain psychological states so astounding in their character that he certainly could never have conceived it possible that his humorous sketch, with its absurd conclusion, would for a moment mislead any one. Many persons, however, accepted it as true. Inquiries were made as to the whereabouts of the sufferer, and in an interior county of New York a subscription was actually started for the unhappy victim. The present description of what the amputated really feel and suffer may possibly serve to correct such erroneous beliefs as were caused by this jeu d'esprit.

For the physician the chief interest of the matter arises out of the fact that the "stump," as we call it—for, curiously enough, we have in medical language no Latin synonym for this term—is liable to the most horrible neuralgias, and to certain curious spasmodic maladies. In fact, a stump is rarely a perfectly comfortable portion of the body, and for years is apt to be tender,

easily hurt, and liable at any time to pain. The form of neuralgic torture to which stumps are liable arises from inflamed or hardened conditions of the divided nerves, and very often obliges the sufferer to submit to a second amputation. In one instance, six amputations were done on one leg without

The spasms of stumps are very interesting, and too often incurable, but they involve no pain, and only such annoyance as may come from the part threshing about in a wild and meaningless fashion, so as to excite for its owner attention wherever he goes. We are at liberty to mention a few cases as proving that mental emotion may for a time put a stop to these odd movements. well-known Pennsylvania officer lost his hand in the war, and by too early exposure brought about an unending and wonderful motion of the remainder of the limb, which from that time has never ceased to fly up and down and in and out. Only once, when his regiment was in sad peril of capture, the colonel's arm hung for a few hours motionless. In another sufferer these automatic gymnastics ceased during the panic of a railway collision; while in a third case, of much slighter but quite constant spasm of an arm-stump, it politely showed an interest in its owner by ceasing to quiver for the whole day on which he had made an offer of marriage. The sufferer in one of these cases by no means regards his malady as an unmitigated calamity, because, having engaged in politics, he has only to uncover his jerky arm in order, as he says, to make the greatest kind of a stump speech, and to carry with him the sympathies of the audience.

The tendency of stumps which are ordinarily healthy to respond by pain or spasmodic movements to causes which do not disturb normal parts, is sometimes very curiously exhibited. In certain persons any strong emotion will give pain in the stump, or the act of yawning will make it twitch. In a larger number, as happens in other cases of disease, the coming changes in the weather are announced by pain and twitching in the stump; but in most cases on the Atlantic coast these troubles only come when the wind is from the east, and do not occur when the rainy south winds blow, or as precursors of thunder-storms. This curious subject has been studied with care by certain intelligent men of science who have lost limbs, and they are satisfied of the correctness of the facts as here stated. It would be well to learn what rule prevails west of the Alleghanies and where the east wind has lost its Atlantic sharpness and moisture. certainly seems probable that in our own latitudes, at least, the east wind possesses some qualities which make it altogether peculiar in its power over diseased or wounded parts of the human frame.

It has long been known to surgeons that when a limb has been cut off the sufferer does not lose the consciousness of its existence. This has been found to be true in nearly every such case. Only about five per cent. of the men who have suffered amputation never have any feeling of the part as being still present. Of the rest, there are a few who in time come to forget the missing member, while the remainder seem to retain a sense of its existence so vivid as to be more definite and intrusive than is that of its truly living fellowmember.

A person in this condition is haunted, as it were, by a constant or inconstant fractional phantom of so much of himself as has been lopped away-an unseen ghost of the lost part, and sometimes a presence made sorely inconvenient by the fact that while but faintly felt at times, it is at others acutely called to his attention by the pains or irritations which it appears to suffer from a blow on the stump or a change in the weather.

There is something almost tragical, something ghastly, in the notion of these thousands of spirit limbs haunting as many good soldiers, and every now and then tormenting them with the disappointments which arise when, the memory being off guard for a moment, the keen sense of the limb's presence betrays the man into some effort, the failure of which of a sudden reminds him of his loss.

Many persons feel the lost limb as existing the moment they awaken from the merciful stupor of the ether given to destroy the torments of the knife; others come slowly to this consciousness in days or weeks, and when the wound has healed; but, as a rule, the more sound and serviceable the stump, especially if an artificial limb be worn, the more likely is the man to feel faintly the presence of his shorn member. Sometimes a blow on the stump will reawaken such consciousness, or, as happened in one case, a reamputation higher up the limb will summon it anew into seeming existence.

In many, the limb may be recalled to the man by irritating the nerves in its stump. Every doctor knows that when any part of a nerve is excited by a pinch, a tap or by electricity—which is an altogether harmless means - the pain, if it be a nerve of feeling, is felt as if it were really caused in the part to which the nerve finally passes. familiar illustration is met with when we hurt the "crazy-bone" behind the elbow. This crazy-bone is merely the ulnar nerve, which gives sensation to the third and fourth fingers, and in which latter parts we feel the numbing pain of a blow on the main nerve. If we were to divide this nerve below the elbow, the pain would still seem to be in the fingers, nor would it alter the case were the arm cut off. When, therefore, the current of a battery is turned upon the nerves of an arm-stump the irritation caused in the divided nerves is carried to the brain, and there referred at once to all the regions of the lost limb from which, when entire, these nerves brought those impressions of touch or pain which the brain converts into sensations. As the electric current disturbs the nerves, the limb is sometimes called back to sensory being with startling reality.

On one occasion the shoulder was

thus electrized three inches above the point where the arm had been cut off. For two years the man had ceased to be conscious of the limb. As the current passed, although ignorant of its possible effects, he started up, crying aloud, "Oh, the hand, the hand!" and tried to seize it with the living grasp of the sound fingers. No resurrection of the dead, no answer of a summoned spirit, could have been more startling. As the current was broken the lost part faded again, only to be recalled by the same means. This man had ceased to feel his limb. With others it is a presence never absent save in sleep. "If." says one man, "I should say, I am more sure of the leg which ain't than of the one that are, I guess I should be about correct."

[DEC.

Absurd mishaps sometimes remind men of the unreliability of these ghostly members, which seem to them so distinctly material. In one case, a man believed for a moment that he had struck another with the absent hand. A very gallant fellow, who had lost an arm at Shiloh, was always acutely conscious of the limb as still present. On one occasion, when riding, he used the lost hand to grasp the reins, while with the other he struck his horse. He paid for his blunder with a fall. Sensitive people are curiously moved by the mental shock which comes from such failures of purpose. In one case, the poor fellow, at every meal for many months, would try to pick up his fork, and failing would be suddenly seized with nausea; so that at last his wife habitually warned him.

How remarkable must be the sense of the existence of the part lost is to be gathered from the fact that even after twenty or thirty years men are sometimes deceived by this sensation into acts which are founded on a moment of deception as to the real presence of the limb. Naturally enough, this is apt to be the case when first rallying the senses on awaking from sleep. deed," says one sufferer, writing of this point, "every morning I have to learn anew that my leg is enriching a Virginia wheat crop or ornamenting some horrible museum."

But while most men are thus conscious of a lost limb as still in place, the spirit member is never complete. The foot or hand are most distinctly felt, and then the ankle or wrist. The parts between these and the knee or elbow, as the case may be, are seemingly indistinct or absent, and any missing parts yet higher up are totally unfelt. In some cases half a hand is gone, and only a phantom finger or two remain somewhere in air, with an utter abolition of every other portion of the arm. Probably some of these curious facts depend upon certain of the nerve-ends in the stump being kept irritated, while others are perfectly sound and undisturbed. In accordance with these facts, the pains referred to lost parts are usually felt in the hand or foot, and very rarely elsewhere.

Perhaps the oddest of all the phenomena which may follow amputation is the gradual shortening which the patient imagines to be undergone by the phantom limb. In a certain proportion of instances of removal of a member above the knee or elbow, the lost arm or leg begins to lose length very early, and by a gradual process the hand at length seems to be set at the elbow or the foot at the knee. All sense of the intervening parts is lost, and in rare cases the hand appears to be actually imbedded in the stump. A patient describing this condition insisted that the stump felt far less distinctly present than the hand, which, for him, appeared to lie in the stump, save that the finger-ends projected beyond it. this point the hand remained, and has moved no farther.

The explanation of these very singular symptoms is by no means easy. It seems probable that our knowledge of the whereabouts of an extremity, and of what it is doing, depends upon a host of sensory impressions, some of them visual, some derived from the muscles or joints, and some from the surfaces of the skin. Suppose that a limb be lost, and that in the stump are at work

certain morbid irritations which affect the divided nerve-ends. Two results will follow: first, we cease to have consciousness of the hand or foot as set at any fixed distance from the body; second, the impressions arising from the cut nerve-ends in the stump are constantly referred, as I explained above, to the lost limb; and because the largest distribution of nerves of feeling is to the hand and foot, in these chiefly seem to lie all such subjective sensations, few or none being felt as in the intervening limb. Since the stump is the lowest visible point where pain or touch is felt, the sensorium or central organ of feeling gradually associates in place the lost hand or foot with the stump, the most remote existing part, impressions on which are referred to the lost limb. Hence arises a notion of shortening in the absent member-an idea which is more and more faintly contradicted by previous knowledge, and more and more reinforced by present subjective sensations.

This explanation, although not altogether satisfactory, receives some further support from other facts. When we replace the lost leg by an artificial member-which for purposes of motion competently supplies the place of the missing limb-such feelings as result in the notion of shortening are continually antagonized by the seeing of the foot in its position and by its fulfillment of function, while this is aided by the impressions which come to the brain from such of the remaining upper muscles as move in the act of walking, and which equally act in locomotion with the acquired member. It is then found that by degrees the leg seems to lengthen again, until once more the foot assumes its proper place. It is also very interesting to learn that after this has occurred, prolonged attention to the limb or an attack of neuralgia or talking about it may provoke anew the impression of diminished length of the part

The sensations seemingly felt in the lost member are most frequent in such as have diseased or sensitive stumps. The lost fingers itch or give pain or

tingle, and relief is had by scratching the stump, while many have a hot or cold hand as the stump is overheated or chilled.

As a rule, the leg is less vividly present than the arm, and is thought to hang down straight, there being uncertainty after hip-amputation as to whether it swings or not in walking with a crutch. It hardly ever seems bent, while in arm-cases of loss above the elbow the limb is felt nearly always as if bent at the elbow, the hand lying in front of, close to or off from the chest in air; and this position is still insisted upon as existing even when there is no distinct notion of flexion at the elbow. The hand is open or half open in some: in others it is a shut fist.

Many readers will recall a bit of newspaper science which described the retina of the eye as having indelibly fixed upon it the last scene which it reflected during life. This fable is realized in the case of many lost limbs. The bent posture of the lost arm is frequently that which it had for a few hours or days There are some before its removal. cases of hands which have been crushed or burned, and the fingers remained painfully rigid in life or bound on a splint. Just so for ever do they continue when the injured limb has been cut off. In one very remarkable example the thumb was, by a violent spasm, bent in on the palm during nine hours which separated the time of reception of the wound from that of amputation. From that day to this the bent thumb-nail tortures the palm which it wounded in life. The latest and most overpowering sensation is thus for all time engraved upon the brain, so that no future shall ever serve to efface it. In cases such as these the patients suffer horribly, and every attempt to will a movement of the lost part results in the utmost pain.

Perhaps it may create surprise that we should speak of moving the absent part; yet, as regards motion no less than feeling, the idea of the material existence of the part is often quite perfect. Sometimes the ghostly members

are in a perpetual state of automatic activity, and the fingers open and shut or twist across one another, especially when there is about to be a change of weather. A few sufferers have no power to stir these shadowy fingers or toes, but a good many have the ability to execute with them, or to seem to execute, any movement of which the healthy part is capable, although such efforts are usually annoying, exact uncommon exertions of the will, and cause spasmodic twitches in the muscles of the stump, and sometimes great general nervousness or sense of exhaustion.

Experiments with the electric current on the nerves of motion in the stump are most instructive. If, for example, we pass an interrupted current through these nerves, we cause sensations referred to the lost limb, but we seem also to produce muscular movement in it. The lost fingers open and shut, and a puzzled expression comes upon the face of their owner as he grows conscious of their pranks.

It is even possible thus to seem to move parts over which there is no volitional control, or which have never seemed to stir since their loss. In the instance of the thumb which was spoken of as always bent into the palm, it was lifted from its place by electricity applied to the arm-nerves in the neck, and by varying the position of the conductors was more violently flexed again; nor was the patient prepared for the occurrence of such phenomena. The effects of these unseen motions upon the individual thus examined were sometimes startling. To become thus again conscious of a ghostly bit of yourself which had been laid for years must certainly be somewhat surprising to the least emotional of men.

For the physiologist these experiments are full of interest, because they help to cast light upon some of the problems connected with the sensations which arise in the mind during muscular movement. These are probably dual. When we will an act, there arise in the consciousness two sets of impressions: the cerebral masses awaken the

ganglia which lie beneath them in the brain and spine, and these in turn direct nerve force along nerves and on to muscles. In some of these ganglia impressions as to the motion made and the parts stirred seem to arise from original construction and long habit; so that, the arm being off, we will to shut the hand, and at once we have a realization of the motion being efficient and complete. But in full health we receive in the brain, when we move a part, impressions as to the force exerted, the position gained, and the like, which are messages from the part moved, and which at once become of value in regulating, directing or checking the movement. The nerves which carry such information to the conscious brain when electrized in the stump convey at once to the head sensations which, seeming to come from the muscles of the lost limb, create in the brain the illusion of their having moved.

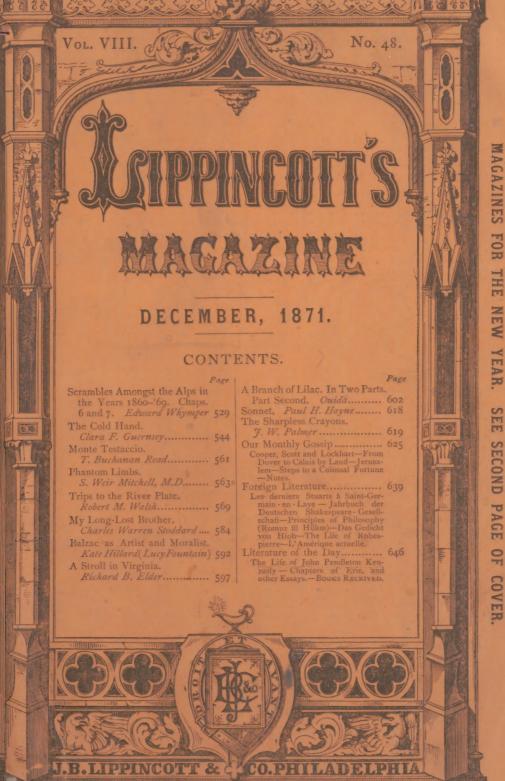
It should be added, that the experiments on which rest these speculations were many of them made on persons whose limbs had been lost when they were too young to remember them at all. No one seems to have examined in these directions any of the cases of people born without limbs—an instance of which exists in the person of a well-known member of Parliament. It would be worth while to learn if these unfortunates possess any consciousness of their missing members.

S. WEIR MITCHELL.

TRIPS TO THE RIVER PLATE.

TN 1842 the South American squadron I of the United States, commanded by Commodore Morris, consisted of the ship-of-the-line Delaware, one frigate, three corvettes and a brig. Among the corvettes was the Decatur, Captain Henry Ogden, one of the most accomplished officers of whom our navy could boast, who kindly invited me to accompany him on the cruise of the squadron to the Rio de la Plata from Rio de Janeiro in the first month of the year. The voyage ought not to have occupied more than a week, even under unfavorable circumstances; but as exercising and manœuvring were the main objects of the commodore, a much longer time was consumed-so much longer, indeed, as to convince a landsman that the nautical phrase, fleet-sailing, is the most preposterous of misnomers. One of the saddest spectacles I have ever beheld was that which presented itself to my terra-firma eyes on the tenth morning out, when I first went on deck. It was nothing more nor less than the

guardian sentinels of the bay of Rio, the Corcovado and Sugar Loaf, which the capers of the chief had contrived to get us back to-very usefully, doubtless, for the discipline of the crews, but very distressingly to the patience of landlubberish souls. At times, however, there was compensation in the interest of the manœuvres, especially in those which were designed to test the relative merits of the vessels and the skill of their commanders. In almost all of these competitive exhibitions the Decatur was so pre-eminent as to stir the stagnant blood of nausea itself. Captain Ogden had brought his ship into such condition, in every way, that he could manage it as brilliantly as the most accomplished cavalier ever controlled his thoroughbred steed. His death, in the maturity of his capabilities, was a serious loss to the service, but even then his health was so bad as to awaken admiration of his energy. He took such pride, too, in his profession that one could not but warmly sympathize with his delight



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